

## Gold King Mine

### Revised Approach for Construction

We started the Gold King project in September of 2014. There are several changes that have been identified once we started the excavation of the portal. Listed below are those changes and the revised approach to the construction of the portal area.

- 1.) Ramp up approximately 12' to reach the top of the high wall.
- 2.) Excavate loose material from the top of the high wall.
- 3.) Drill in wire mesh anchors.
- 4.) Hang wire mesh on the high wall as we excavate to the sill of the portal.
- 5.) Excavate to the sill and into the competent rock face at the portal.
- 6.) Gradually lower the debris blockage with the appropriate pumping of the impounded water to water management/treatment system (supplied by others), to prevent the uncontrolled release of mine water.
- 7.) Install bedding material for a 20' length of 10' diameter culvert section. We will follow DRMS specifications as indicated on standard drawing #5.
- 8.) Install a 20' length of 10' diameter culvert section.
- 9.) Install a drain pipe or pipes below the portal culvert. This drain pipe or pipes will be sized for a minimum capacity of 200 GPM. It will be extended into the adit as necessary to keep the steel sets in the dry.
- 10.) Seal the culvert at the rock face.
- 11.) Determine the requirement for grouting around the portal pipe and brow/adit connection as per DRMS specifications, or develop an alternative design. It is not currently believed that grouting of the backfill will be necessary.
- 12.) Backfill the culvert over the top with 2' back 5' from the rock face, and 5' high on both sides for 15'. We will follow DRMS specifications for non-mineralized material against the pipe.
- 13.) Install utilities for underground operations during construction, we will install 2" air line for drilling, a 2" water line for drilling, 2" discharge line for removal of mine water, a 120 VAC power line for lights and small tools, a 480 VAC power line for pumps to control mine water when needed, and if required a 12" ventilation line. All electrical requirements will be supplied by use of our 100 KW portable generator. A mine phone communication line will also be installed if required.
- 14.) Build access road for tunnel mucker. Once the mine dump has been excavated by others to an elevation suitable for mine drainage.
- 15.) Support the brow at the portal.
- 16.) Muck and support 100' in-by the portal, as determined appropriate by the EPA-OSC.
- 17.) Install a locking double adit door closure 8'Hx8'W adapted from Standard drawing #5 and #7.

Revised approach for construction:

Harrison Western will mobilize the project with equipment and materials to accomplish the work listed above. We will then build a ramp up approximately 12' to enable us reach the top of the high wall above the portal. We will excavate all the loose from the top of the high wall back about 5' from the edge of the high wall. We will install 4' long resin anchors to support the wire mesh, there will be about 16 of these. We will hang wire mesh from these anchors, approximately 1250 square feet of mesh material. As we excavate the ramp material back down and away from the portal we will allow the wire mesh to descend slopes around the portal. Occasionally we may have to install a few spot bolts to support the rock and the wire on the way down, this will be accomplished using 5' split-set bolts. We will continue this process until we have excavated to hard rock at the sill and portal, or hard rock at the portal and 2' below the elevation of the portal for the installation of the drain pipe and pipe bedding material. Impounded mine water will be pumped down below the top of the debris blockage to allow a controlled removal of earthen debris and buried timbers, piping, etc. Pumping control will be maintained on the mine water at all times during the blockage excavating operations. The water shall be pumped to the designated containment basin, (constructed by others), and managed by the EPA-ERRS contractor.

Following the removal of the portal blockage, the elevation of the bottom of the portal appears to be 4' to 5' below the elevation of the waste dump surface, and about 2' below the bottom of the concrete drainage channel. This is based on the observation that there are two sections of 24" pipe, stacked, sitting immediately below the cross timber at the adit back and sat at the surface of the dump. If the adit is a 10'X10' opening, as reported, then there is approximately 5' to 6' below the bottom of the pipe to the floor of the adit. Based on this condition, it appears that the waste dump surface will have to be excavated to the appropriate elevation to allow the adit drainage to enter the underflow pipe and discharge into a channel such as currently exists. This requires only the area between the drainage channel and the portal area be lowered.

We will install approximately 2' thick of bedding material from the rock face at the portal back 25' from the face and approximately 20' width. We will install a drain pipe or pipes with the capacity to handle at least 200 GPM. We are assuming there is suitable bedding material located on site for one foot of the two foot required for drain installation the other 1' of non-mineralized material will be sourced, purchased and delivered to the site and installed following DRMS specifications. We will install 2-10' length X 10' diameter culvert sections, this culvert will be placed as close to the rock face as possible, leveled, and sealed at the rock face using belting attached to the rock face and the culvert section. We will place back fill material 2' over the culvert and 5' back from the portal area or brow. We will then continue to back fill on both sides of the culvert sloping it down to the front edge of the culvert sections furthest from the portal. We are assuming that suitable backfill material can be found on site.

At this point we will set up our equipment and install utilities to the portal area. We intend to install a 2" airline, a 2" waterline,(for drilling), a 2" discharge line, a 12" ventilation line, a 480v line for electric pumps, and a 120v power line for lighting or power tools. All electrical will be supplied via our 100KW generator. We will then support the brow using either 5' split-set bolts or possibly steel sets. Steel sets and rock bolts will be installed to prevent contact with acidic mine water. If steel sets are required we anticipate modifying existing steel sets that are stored close to the site. At this point we will

muck and support the tunnel in-by from the portal for a distance of 100' or as determined appropriate by the EPA-OSC. We are not sure at this point how much muck will have to be removed from the tunnel, or what type of support for the rock will be needed for the length of the tunnel.